REMARKS

This responds to the Office Action mailed on January 17, 2006, and the references cited therewith. Reconsideration is respectfully requested.

Claims 1, 3, 5 – 7, 9 – 11, 14, 16 – 22 and 29 are amended, no claims are canceled; as a result, claims 1-29 remain pending in this application.

Allowable Subject Matter

Claims 2 – 4, 8-10, 12, 13, 16, 23-25 and 27 are allowed. Claims 3, 5 and 16 have been amended to correct typographical errors noted during review.

§*102 and* §*103 Rejection of the Claims*

Claims 1, 5, 7, 11, 14, 15, 17, 22, 26 and 28 were rejected under 35 U.S.C. § 103(a) as being unpatentable over Butler (U.S. 6,950,021) in view of Uematsu et al. (U.S. 6,130,640).

Claims 6, 18 – 21 and 29 were rejected under 35 U.S.C. § 103(a) as being unpatentable over Butler (U.S. 6,950,021) in view of Uematsu et al. (U.S. 6,130,640) in further view of Foss et al. (U.S. 4,654,622).

Applicants' claim 1, as amended, is directed to an area protection system that generates a high-power millimeter-wave wavefront when an intruder is detected in a protected area. The area protection system includes sensors to detect an intruder within the protected area and an active-array antenna to generate the high-power millimeter-wave wavefront to deter the intruder when detected within the protected area. The area protection system also includes one or more reflectors positioned within the protected area to help retain energy of the wavefront within the area. Claim 1 further recites that the active-array antenna comprises a plurality-semiconductor wafers arranged together on a substantially flat surface and that each semiconductor wafer includes a power amplifier and a transmit antenna which together generate the high-power millimeter-wave wavefront. Independent claims 7 and 22 have similar recitations.

Applicants submit that the following elements of Applicants' independent claims 1, 7 and 22 are not taught suggested or motivated by the cited references, either separately or in combination:

1) Generating a high-power wavefront ***in response to*** the detection of an intruder;

2) Using high-power millimeter-waves ***to deter*** an intruder (e.g., by inflicting pain);

3) Using reflectors ***to retain*** energy in a protected area; and

4) An active-array antenna comprising a plurality of individual semiconductor wafers to generate a high power wavefront where ***each wafer*** includes a power amp and a transmit antenna.

<u>Discussion of Butler:</u>

Butler discloses an electronic wall to detect an intruder. The electronic wall is generated using high-resolution millimeter-wave radar signals. Butler's wall must be active to detect an intruder. This requires that the high-resolution millimeter-wave radar signals are generated before an intruder is detected (see Butler Abstract). This is unlike Applicants' claim 1 which recites that a high-power wavefront is generated ***when*** an intruder is detected.

Butler uses high-resolution millimeter-wave radar signals to ***detect*** an intruder. This is unlike Applicants' claim 1 which recites generating high-power millimeter-waves to ***deter*** an intruder. Butler fails to show using high-power millimeter-waves to deter an intruder. Butler simply detects the intruder using a high-resolution millimeter-wave radar by establishing an electronic wall. Applicants find no teaching, suggestion or motivation for generating a wavefront in Butler ***in response to*** an intruder. Butler's purpose is to ***detect*** an intruder with radar signals by dispersing the radar signals to generate the electronic wall.

Butler has also been cited by the Examiner for disclosing reflectors. The reflectors in Butler are part of the electronic wall used for detecting intruders (see reflectors 9 and 13 in FIG. 2, and reflector 97 in FIG. 8 of Butler). The use of reflectors to retain energy of a wavefront within a protected area is not shown by Butler. Butler does not retain energy with reflectors, but uses the reflectors to spread the radar signals over a greater area to provide the electronic wall (see FIG. 2, etc). In this way, Butler ***teaches away*** from Applicants' claimed invention. A reference may be said to teach away when a person of ordinary skill, upon reading the reference,

would be discouraged from following the path set out in the reference, or would be led in a direction divergent from the path the applicant took. *In re Gurley*, 27 F.3d 551, 31 USPQ 2d 1130, 1131 (Fed. Cir. 1994); *United States v. Adams*, 383 U.S. 39, 52, 148 USPQ 479, 484 (1966); *In re Sponnoble*, 405 F.2d 578, 587, 160 USPQ 237, 244 (C.C.P.A. 1969); *In re Caldwell*, 319 F.2d 254, 256, 138 USPQ 243, 245 (C.C.P.A. 1963). When reading Butler, one of ordinary skill in the art would be discouraged from using reflectors to retain energy in a confined area, as in Applicants' area protection system. Applicants' claim 5, for example, recites that the reflectors are positioned to ***increase*** an energy ***density*** of the wavefront in a predetermined location of the protected area.

According to the Examiner, Butler fails to disclose an active-array antenna. However, according to the Examiner, Butler discloses generating and modulating the electromagnetic energy of multiple or two-segment millimeter beams to the radar antenna 8 (per FIG. 9 and column 19, lines 56 – 62). In Butler, the single radar antenna 8 is used to both transmit and receive radar signals. Applicants find no teachings in Butler of an active array antenna comprising a plurality of individual semiconductor wafers to generate a high power wavefront where ***each wafer*** includes a power amp and a transmit antenna. Butler's Figure 9 shows the antenna being separate from the transmitter and receiver and does not even show a power amplifier on a semiconductor wafer.

Discussion of Uematsu:

Uematsu has been cited by the Examiner for disclosing a plurality of planar antenna elements 12a – 12p, and amplifiers 15a – 15p, shown in FIG. 2 of Uematsu. Applicants' independent claims 1, 7 and 22 recite an active-array antenna comprising a plurality of individual semiconductor wafers to generate a high power wavefront where ***each wafer*** includes a power amp and a transmit antenna. In Uematsu, the amplifiers 15a – 15p are located on ***separate*** MMIC substrates 13a – 13p, which are separate from antennas 12a – 12p (see column 7, lines 29 – 45 and FIGs. 1 – 3). Furthermore, all of antennas 12a-12p in Uematsu are part of the ***same*** dielectric substrate. None of the antennas are located on separate semiconductor substrates. Applicants find no teaching in Uematsu that ***individual*** semiconductor wafers ***each*** have a transmit antenna and a power amplifier.

Discussion of Foss

Foss has been cited by the Examiner for disclosing a planar array antenna. Applicants find no teaching in Foss that ***individual*** semiconductor wafers ***each*** have a transmit antenna and a power amplifier. In Foss, a plurality of antennas 14 are fabricated on a ***single*** semiconductor substrate wafer 10 (See FIG. 2A and column 2, lines 24 – 36). The ***single*** semiconductor substrate wafer 10 also includes preamplifier array 30 (see FIG. 4). Therefore, combining Foss with Butler and/or Uematsu does not result in Applicants' claimed invention.

In Applicants' claim 1, for example, the array antenna actually generates the high power wavefront. This is possible because Applicants' antenna includes a power amplifier and a transmit antenna on each semiconductor wafer. Foss's single semiconductor wafer 10 does not include elements for transmitting nor is it suitable for transmitter high-power millimeter-waves. The amplifiers of Foss (bi-polar preamplifier array 30) are for amplifying *received* signals. Foss's applicability is limited to sensing signals (see column 1 lines 7 – 24). Applicants submit that those of ordinary skill in the art would not look to Foss for generating a high-power wavefront.

In view of the above, Applicants submit that the combination of Butler, Uematsu and Foss does not result in Applicants claimed invention and that the rejection of independent claims 1, 7 and 22 has been overcome. Dependent claims 5, 6, 11, 15 and 17 – 21, 26, 28 and 29 are believed to be allowable at least because of their dependency on one of the independent claims.

Claim 11 further distinguishes over the cited references by reciting a beam director to configure the array antenna to direct the high-power millimeter-wave wavefront toward the intruder to deter the intruder in response to the tracking-control signal. None of cited references use high-power millimeter-waves to deter an intruder. Furthermore, none of the cited references ***actively direct*** a high-power millimeter-wave wavefront toward the intruder to deter the intruder.

Claim 19 and 20 further distinguish over the cited references by reciting that the array antenna receives a ***spatially-fed*** millimeter-wave lower-power wavefront and is to amplify the lower-power wavefront to generate the high-power wavefront. As recited in claim 19, each

semiconductor wafer also includes a receive antenna to receive millimeter-wave signals of the spatially-fed millimeter-wave lower-power wavefront for subsequent amplification by the power amplifier and transmission by the transmit antenna of an associated semiconductor wafer. Claim 20 recites that a passive reflector reflects a millimeter-wave frequency signal from a feed and provides the lower-power wavefront for incident on the active reflect-array comprising the plurality of semiconductor wafers.

Claim 20 further recites that the plurality of semiconductor wafers is arranged on an at least partially ***parabolic surface***. None of the cited references, teach, suggest or motivate a spatially fed active reflect array antenna having a plurality of semiconductor wafers is arranged on an at least partially parabolic surface. Applicants point out that since semiconductor wafers are not flexible, it would not be possible to use a single semiconductor wafer with a parabolic surface.

Claims 20 further distinguishes over the cited references by reciting that the receive and transmit antennas have orthogonal polarizations. This is not taught, suggested or motivated by any of the cited references

Applicants' claims 6 and 18, as amended, recite that the high-power wavefront is coherent. This is not taught, suggested or motivated by any of the cited references.

Claim 14, as amended, distinguishes over the cited references by reciting that a passive reflect-array antenna provides a high-power millimeter-wave wavefront in response to the detection of an intruder to deter the intruder. The passive reflect-array antenna comprises a plurality of semiconductor wafers arranged on a surface to reflect a spatially-fed incident millimeter-wave signal to generate the high-power millimeter-wave wavefront. As recited in claim 14, each semiconductor wave comprises a receive antenna coupled to a transmit antenna to respectively receive and retransmit the spatially-fed incident millimeter-wave signals. Applicants find no teaching, suggestion or motivation in any of the cited references of reflecting a spatially fed millimeter-wave signal with individual semiconductor wafers, each having a receive and a transmit antenna. Claim 29 has some similar recitations.

Claims 14 further recites that the plurality of semiconductor wafers is arranged on an at least partially parabolic surface and that the receive and transmit antennas have orthogonal polarizations. This is not taught, suggested or motivated by any of the cited references.

In view of the above, Applicants submit that the rejections of claims 1, 5 - 7, 11, 14, 15, 17 – 22, 26, 28 and 29 under 35 U.S.C. § 103(a) has been overcome.

CONCLUSION

Applicant respectfully submits that the claims are in condition for allowance, and notification to that effect is earnestly requested. The Examiner is invited to telephone Applicants' attorney Gregory J. Gorrie at (480) 659-3314 or Applicants' below-named representative at (310) 647-3723 to facilitate prosecution of this application.

If necessary, please charge any additional fees or credit overpayment to Deposit Account No. 50-0888.

Respectfully submitted,

By their Representatives,

Raytheon Company
P.O. Box 902
El Segundo, CA 90245

Date May 11, 2006

By [signature]
John Gunther
Reg. No. 43,649